This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.

If you have a suggestion to make the keys better, please fill out the short survey here.

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

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1. Find the inverse of the function below. Then, evaluate the inverse at $x = 6$ and choose the interval that $f^-1(6)$ belongs to.

$$f(x) = e^{x-4} - 4$$

The solution is $f^{-1}(6) = 6.303$, which is option D.

A. $f^{-1}(6) \in [-7.31, -2.31]$

This solution corresponds to distractor 2.

B. $f^{-1}(6) \in [-1.7, 3.3]$

This solution corresponds to distractor 3.

C. $f^{-1}(6) \in [-7.31, -2.31]$

This solution corresponds to distractor 4.

D. $f^{-1}(6) \in [6.3, 9.3]$

This is the solution.

E. $f^{-1}(6) \in [-1.7, 3.3]$

This solution corresponds to distractor 1.

General Comment: Natural log and exponential functions always have an inverse. Once you switch the x and y, use the conversion $e^y = x \leftrightarrow y = \ln(x)$.

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2. Multiply the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = 8x + 2 \text{ and } g(x) = \sqrt{3x + 14}$$

The solution is The domain is all Real numbers greater than or equal to$x = -4.67$., which is option B.

A. The domain is all Real numbers less than or equal to $x = a$, where $a \in [-2.17, 1.83]$

B. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [-5.67, -2.67]$

C. The domain is all Real numbers except $x = a$, where $a \in [2.25, 7.25]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [4.67, 12.67]$ and $b \in [6.67, 10.67]$

E. The domain is all Real numbers.

General Comment: The new domain is the intersection of the previous domains.

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3. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -14$ and choose the interval that $f^-1(-14)$ belongs to.

$$f(x) = 5x^2 - 4$$

The solution is The function is not invertible for all Real numbers. , which is option E.

A. $f^{-1}(-14) \in [4.27, 4.55]$

Distractor 3: This corresponds to finding the (nonexistent) inverse and dividing by a negative.

B. $f^{-1}(-14) \in [1.76, 2.08]$

Distractor 2: This corresponds to finding the (nonexistent) inverse and not subtracting by the vertical shift.

C. $f^{-1}(-14) \in [1.22, 1.83]$

Distractor 1: This corresponds to trying to find the inverse even though the function is not 1-1.

D. $f^{-1}(-14) \in [6.66, 7.48]$

Distractor 4: This corresponds to both distractors 2 and 3.

E. The function is not invertible for all Real numbers.

* This is the correct option.

General Comment: Be sure you check that the function is 1-1 before trying to find the inverse!

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4. Subtract the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = 7x + 8 \text{ and } g(x) = \sqrt{-4x + 11}$$

The solution is The domain is all Real numbers less than or equal to$x = 2.75$., which is option B.

A. The domain is all Real numbers greater than or equal to $x = a,$ where $a \in [-5.6, -3.6]$

B. The domain is all Real numbers less than or equal to $x = a,$ where $a \in [-0.25, 3.75]$

C. The domain is all Real numbers except $x = a,$ where $a \in [-11.2, -6.2]$

D. The domain is all Real numbers except $x = a$ and $x = b,$ where $a \in [-9.8, -4.8]$ and $b \in [-4.2, 1.8]$

E. The domain is all Real numbers.

General Comment: The new domain is the intersection of the previous domains.

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5. Choose the interval below that f composed with g at $x = 1$ is in.

$$f(x) = -x^3 + 2x^2 + x - 3 \text{ and } g(x) = 2x^3 + 2x^2 - 2x$$

The solution is -1.0, which is option B.

A. $(f \circ g)(1) \in [1.69, 3.52]$

Distractor 1: Corresponds to reversing the composition.

B. $(f \circ g)(1) \in [-2.82, -0.76]$

* This is the correct solution

C. $(f \circ g)(1) \in [3.04, 5.12]$

Distractor 2: Corresponds to being slightly off from the solution.

D. $(f \circ g)(1) \in [7.85, 8.59]$

Distractor 3: Corresponds to being slightly off from the solution.

E. It is not possible to compose the two functions.

General Comment: f composed with g at x means $f(g(x))$. The order matters!

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6. Choose the interval below that f composed with g at $x = 2$ is in.

$$f(x) = -2x^3 + 3x^2 + 2x \text{ and } g(x) = -2x^3 + 2x^2 + 4x$$

The solution is 0.0, which is option B.

A. $(f \circ g)(2) \in [-0.5, 0.1]$

Distractor 1: Corresponds to reversing the composition.

B. $(f \circ g)(2) \in [-0.5, 0.1]$

* This is the correct solution

C. $(f \circ g)(2) \in [9.4, 11]$

Distractor 2: Corresponds to being slightly off from the solution.

D. $(f \circ g)(2) \in [5.2, 9.2]$

Distractor 3: Corresponds to being slightly off from the solution.

E. It is not possible to compose the two functions.

General Comment: f composed with g at x means $f(g(x))$. The order matters!

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7. Determine whether the function below is 1-1.

$$f(x) = -20x^2 - 247x - 713$$

The solution is no, which is option A.

A. No, because there is a y-value that goes to 2 different x-values.

* This is the solution.

B. Yes, the function is 1-1.

Corresponds to believing the function passes the Horizontal Line test.

C. No, because the domain of the function is not $(-\infty, \infty)$.

Corresponds to believing 1-1 means the domain is all Real numbers.

D. No, because there is an x-value that goes to 2 different y-values.

Corresponds to the Vertical Line test, which checks if an expression is a function.

E. No, because the range of the function is not $(-\infty, \infty)$.

Corresponds to believing 1-1 means the range is all Real numbers.

General Comment: There are only two valid options: The function is 1-1 OR No because there is a y-value that goes to 2 different x-values.

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8. Determine whether the function below is 1-1.

$$f(x) = 36x^2 + 300x + 625$$

The solution is no, which is option D.

A. No, because the domain of the function is not $(-\infty, \infty)$.

Corresponds to believing 1-1 means the domain is all Real numbers.

B. No, because the range of the function is not $(-\infty, \infty)$.

Corresponds to believing 1-1 means the range is all Real numbers.

C. Yes, the function is 1-1.

Corresponds to believing the function passes the Horizontal Line test.

D. No, because there is a y-value that goes to 2 different x-values.

* This is the solution.

E. No, because there is an x-value that goes to 2 different y-values.

Corresponds to the Vertical Line test, which checks if an expression is a function.

General Comment: There are only two valid options: The function is 1-1 OR No because there is a y-value that goes to 2 different x-values.

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9. Find the inverse of the function below. Then, evaluate the inverse at $x = 10$ and choose the interval that $f^-1(10)$ belongs to.

$$f(x) = \ln(x - 3) + 5$$

The solution is $f^{-1}(10) = 151.413$, which is option B.

A. $f^{-1}(10) \in [442417.39, 442419.39]$

This solution corresponds to distractor 2.

B. $f^{-1}(10) \in [150.41, 156.41]$

This is the solution.

C. $f^{-1}(10) \in [140.41, 151.41]$

This solution corresponds to distractor 3.

D. $f^{-1}(10) \in [3269014.37, 3269023.37]$

This solution corresponds to distractor 1.

E. $f^{-1}(10) \in [1097.63, 1104.63]$

This solution corresponds to distractor 4.

General Comment: Natural log and exponential functions always have an inverse. Once you switch the x and y, use the conversion $e^y = x \leftrightarrow y = \ln(x)$.

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10. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 10$ and choose the interval that $f^-1(10)$ belongs to.

$$f(x) = \sqrt[3]{5x + 4}$$

The solution is 199.2, which is option B.

A. $f^{-1}(10) \in [-199.5, -199.1]$

This solution corresponds to distractor 2.

B. $f^{-1}(10) \in [198.4, 199.8]$

* This is the correct solution.

C. $f^{-1}(10) \in [199.5, 202.3]$

Distractor 1: This corresponds to

D. $f^{-1}(10) \in [-203.4, -200.2]$

This solution corresponds to distractor 3.

E. The function is not invertible for all Real numbers.

This solution corresponds to distractor 4.

General Comment: Be sure you check that the function is 1-1 before trying to find the inverse!
